Teacher Guide for the Lesson on **total surface area**

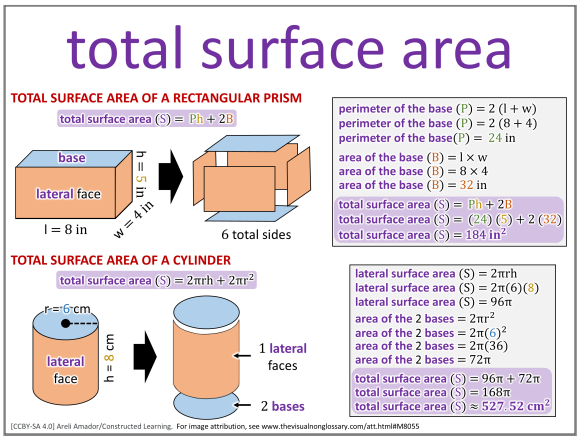
Standard:
8.7(B)

Content Objective:
We can use the formula for **total surface area** to determine solutions for problems involving rectangular prisms and cylinders.

Language Objective: Answer the following question in complete sentences using the sentence stem and the key vocabulary of the lesson:

> Why do you think **total surface area** is important in the construction industry?
>
> *I think **total surface area** is important in the construction industry because...*

Other key vocabulary: volume



By studying this visual, students might:

Notice	Wonder
• There is a rectangular prism and a cylinder.	• Why do you have to add up all the sides separately?
• Both shapes get unfolded.	• Is the formula the same for every 3D shape?
• The rectangular prism has 6 sides.	• What is the difference between total surface area and just area?
• There are formulas and numbers.	• When would someone actually use this in real life?
• The sides are added together at the end.	• Why does the cylinder formula have pi in it but the rectangular prism one does not?

EXTENDING THE DISCUSSION

- After randomly calling on students, if there is anything from this list that was not mentioned, then ask the class, "Did anyone notice...?"
- After students have shared what they notice, ask the class, "Did anyone wonder...?" using the suggestions above or anything else you might think is interesting or relevant to the lesson.

Structured Conversation Prompts

OBSERVATIONAL	RELATIONAL	INFERENTIAL
What is **total surface area** ? **Total surface area** is...	How is **total surface area** different from **volume**? **Total surface area** is different from **volume** because...	Why do you think **total surface area** is important in the construction industry? I think **total surface area** is important in the construction industry because...

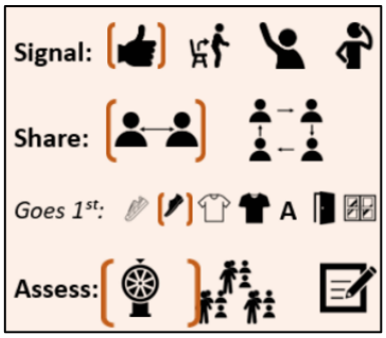
Example Student Responses to the Observational Question

Low-Level	High-Level
Total surface area is the measurement of all the outside faces of a 3D shape added together.	**Total surface area** is the sum of the areas of all faces of a three-dimensional figure, including the lateral face and both **bases**.

RESPONDING TO RESPONSES

Emphasize and celebrate each student's use of the key vocabulary to support a culture of "no wrong answers."

STRUCTURING STUDENT CONVERSATIONS



Have students list observations from the visual as a warm-up, then use the Q-SSS-A process to guide small-group conversations. In the slide decks, brackets can be moved to prepare the structured conversation. In the example to the right, students will be instructed: Q-SSS-A.

- To put a thumb up, then lower their hand when they are ready to answer the question
- To share with their elbow/shoulder partner, and that the student with the darkest shoe will share first
- That they will be randomly called on after the conversation

Here is an example of structuring a conversation with Q-SSS-A.

Note: the inferential question is the same as the language objective. It is recommended that students answer the inferential question in a small-group discussion before answering it individually as the closure or exit ticket of the lesson.

Structured Reading

READING PURPOSE	PAT LIST	POST-READING DISCUSSION
The purpose for reading is to understand how **total surface area** is calculated for three-dimensional figures and why it is useful in real-world situations.	• The formula for total surface area and what each part of the formula represents • How the perimeter of the base and area of the base are calculated and used in the formula • How total surface area is applied in a real-world situation	Using the formula $S = 2\pi rh + 2\pi r^2$, how would you calculate the **total surface area** of the cylindrical candle described in the passage? *I would calculate the **total surface area** of the cylindrical candle by first...*

STRUCTURING THE READING

Communicate the purpose of reading to the students and instruct them to make a note every time they see something on the PAT ("Pay Attention To") list. How you have students note items on the PAT list is up to you. This could include:

- Putting an asterisk in the margin
- Underlining text that supports the PAT list
- Putting a comment in the margin

Follow the reading with the post-reading discussion. Structure this discussion using the Q-SSS-A process just like the structured conversations in this lesson.

Note: you might find the relational question is better discussed before or after the reading. This depends on whether the relational question is directly related to the reading or might make connections across units.

DIFFERENTIATING THE READING

You will notice that three different reading passages are provided with this lesson. Look at the shapes in the top-left of each passage to determine the grade level.

BELOW GRADE LEVEL	ON GRADE LEVEL	ABOVE GRADE LEVEL
		
Triangle is bottom-left	*Square is bottom-left*	*Circle is bottom-left*

In a class with students at diverse reading level proficiencies, you can give the appropriate reading passage to different students, while having all students follow the same PAT list and post-reading discussion.